

Notice of Allowability

Application No.

10/040,184

Examiner

Mark Ruthkosky

Applicant(s)

SAKAMOTO ET AL.

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 3/1/2004.
2. ☒ The allowed claim(s) is/are 1,3-6 and 10-12.
3. ☒ The drawings filed on 04 January 2002 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

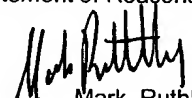
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

 5/10/04
Mark Ruthkosky
Primary Patent Examiner
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DETAILED ACTION

Response to Amendment

Claims 2, 7, 8, and 9 have been canceled by the applicant's amendment. Claims 1, 3-6 and 10-12 are pending in the instant application.

Claim Rejections - 35 USC § 103

The rejection of claims 1-5, 7, and 10-12 under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), and further in view of Kenichi (JP 07-094,182) has been overcome by the applicant's amendment.

The rejection of claims 1-5, 7, and 10-12 under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and further in view of Sei et al (JP 11-238,509) has been overcome by the applicant's amendment.

The rejection of claims 5 and 6 under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509,) as applied above and further in view of Futoshi et al. (JP 11-149,924) has been overcome by the applicant's amendment.

The rejection of claims 8 and 9 under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509,) as applied above and further in view of Mitsunori et al. (JP 11-219,703) has been overcome by the applicant's amendment.

Allowable Subject Matter

Claims 1, 3-6 and 10-12 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a positive electrode for an alkaline storage battery comprising an active material comprising a nickel hydroxide powder, wherein the nickel hydroxide is a solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide. Nickel hydroxide has a tap density of 1.9 g/cm³ or more and a sulfate ion content of 0.5 weight percent or less. The nickel hydroxide material further has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by CuK α - radiation of 0.7-1.2 degrees. The ratio of intensity B of a peak in the pattern attributed to the (001) face near 2θ is equal to $18-21^\circ$ to intensity A of the peak attributed to the (101) face near 2θ equal to 37 to 40° wherein B/A is 1.1 or more. The sulfate ion content in the nickel hydroxide is 0.5 wt.% or less. The active material further contains 0.5-3 parts by weight of an oxide of at least one element selected from the group consisting of Y, Yb, Lu, Ti and Ca per 100 parts by weight of the active material.

The prior art does not teach a positive electrode for an alkaline storage battery comprising an active material comprising a nickel hydroxide powder, wherein the nickel hydroxide is a solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide and 0.5-3 parts by weight of an oxide of at least one element selected from the group consisting of Y, Yb, Lu, Ti and Ca per 100 parts by weight of the active material wherein the nickel hydroxide material further has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by CuK α - radiation of 0.7-1.2 degrees, a ratio of intensity B of

a peak in the pattern attributed to the (001) face near 2θ equal to $18-21^\circ$ to intensity A of the peak attributed to the (101) face near 2θ equal to 37 to 40° wherein B/A is 1.1 and a sulfate ion content in the nickel hydroxide is 0.5 wt.% or less.

The most pertinent prior art has been presented. Ikoma et al. (US 5,700,596) teaches a positive electrode active material for an alkaline storage battery comprising a nickel hydroxide powder solid solution containing magnesium in 2-7 wt. percent in the nickel hydroxide. Nickel hydroxide has a tap density of 1.9 g/cm^3 or more. The mixture does not disclose a sulfate ion content for a magnesium doped nickel hydroxide. Mixtures of other elements, including cobalt and manganese, are noted. The active material is mixed with cobalt powders and cobalt hydroxide to form a positive electrode (col. 11, lines 35-65.) The reference is silent to X-ray diffraction measurements of the material and does not teach 0.5-3 parts by weight of an oxide of at least one element selected from the group consisting of Y, Yb, Lu, Ti and Ca per 100 parts by weight of the active material.

Kenichi (JP 07-094,182) teaches a nickel hydroxide material that has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by $\text{CuK } \alpha$ - radiation in the range of 0.7-1.2 degrees and with a ratio of A_{001} to B_{101} such that A/B is greater than 1.1. The references do not teach a solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide and adding an oxide powder material of Y, Yb, Lu, Ti or Ca to the mix in 0.5-3 parts by weight to the active material.

Mitsunori et al. (JP 11-219,703) teaches an alkaline storage battery with high use coefficient wherein a nickel hydroxide/magnesium solid solution is mixed with 0.5-5% of an yttrium oxide material to form a positive electrode. The reference does not teach a positive

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electrode for an alkaline storage battery comprising an active material comprising a nickel hydroxide powder, wherein the nickel hydroxide is a solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide and 0.5-3 parts by weight of an oxide of at least one element selected from the group consisting of Y, Yb, Lu, Ti and Ca per 100 parts by weight of the active material wherein the nickel hydroxide material further has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by CuK α - radiation of 0.7-1.2 degrees, a ratio of intensity B of a peak in the pattern attributed to the (001) face near 2θ equal to $18-21^\circ$ to intensity A of the peak attributed to the (101) face near 2θ equal to 37 to 40° wherein B/A is 1.1 and a sulfate ion content in the nickel hydroxide is 0.5 wt.% or less.

In addition, Futoshi et al. (JP 11-149,924), however, teaches an alkaline storage battery with improved energy density and cycle life wherein a nickel hydroxide solid particle is coated with a layer of cobalt oxide materials having a valence of +3 or higher to form a positive electrode active material. Further, the nickel hydroxide material has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by CuK α - radiation in the range of 0.7-1.2 degrees and with a ratio of A_{001} to B_{101} such that A/B is greater than 1.1.

As the prior art does not teach a nickel hydroxide is a solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide and 0.5-3 parts by weight of an oxide of at least one element selected from the group consisting of Y, Yb, Lu, Ti and Ca per 100 parts by weight of the active material wherein the nickel hydroxide material further has a half-width of a (101) peak near $2\theta = 37-40$ degree in a powder x-ray diffraction pattern by CuK α - radiation of 0.7-1.2 degrees, a ratio of intensity B of a peak in the

pattern attributed to the (001) face near 2θ equal to $18-21^\circ$ to intensity A of the peak attributed to the (101) face near 2θ equal to 37 to 40° wherein B/A is 1.1 and a sulfate ion content in the nickel hydroxide is 0.5 wt.% or less., the claims are allowed.

The applicant argues that the specific properties of the nickel hydroxide are critical to yielding an active material with high discharge voltage and excellent high rate discharge characteristics as the addition of Mg decreases the charge efficiency at high temperatures, the inclusion of very small amounts of sulfate ion decreases the charge efficiency at high temperatures and, as shown in Figs. 4 and 10 of the present application, when the B/A ratio is at least 1.1, the active material utilization rate increases. Inclusion of the oxide has a significant effect on the charge efficiency at high temperature. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

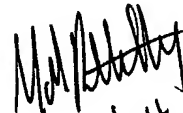
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky

Primary Patent Examiner

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5/10/04